

CLIMATE CHANGE AND WATER SUPPLY IN THE STATE OF WASHINGTON

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Climate change has already created challenges in managing water resources in Washington State, and it is expected to exacerbate those problems in the future. The state's water resources are under stress from more frequent and intense droughts and flooding, as well as changes in the timing and volume of snowpack-fed streamflows. Using strategies identified in *Preparing for a Changing Climate: Washington State's Integrated Climate Change Response Strategy* (2012), the Department of Ecology is spearheading the state's response to climate change.

Impacts on Water Supply

Many areas in Washington rely on snowpack-fed water supply for drinking water, crop irrigation, and streamflow that supports salmon. Two-thirds of the state's electricity needs are met by hydropower. Widespread declines in spring snowpack have occurred since the 1950s, particularly in the Cascade mountain range. Peak runoff is occurring earlier in the year, altering the hydrologic patterns in many watersheds. Warming temperatures also increase summertime demand for water during the same time that less water is available in streams.

Reduced water supply is a key risk of climate change. Ecology has identified these projected impacts of climate change on water resources:

- Reductions in the amount of water naturally stored in snowpack and glaciers, due to rising temperatures and increasing winter runoff.
- Declining late summer streamflow, increasing demand for water, and more intense competition for scarce water resources.
- Increases in winter precipitation, posing additional challenges for managing reservoirs for flood control, fish, and hydropower.
- Reduced water quality due to lower late summer streamflow, warmer summer temperatures, and increased winter flooding.

Climate change impacts are projected to vary across different watersheds. Rain-dependent basins will likely have higher winter streamflow and increased flooding risk. Snowmelt-dominated watersheds will likely have increased winter streamflow, reduced peak spring streamflow, and reduced late summer flow. Mixed rain- and snow-dominated basins are likely to become more rain-dominated, with peak streamflow shifting earlier in the spring and late summer streamflows declining.

State-level Response Strategies

Ecology developed *Preparing for a Changing Climate: Washington State's Integrated Climate Change Response Strategy* with the twin goals of protecting the state from the impacts of climate change and building resiliency to enable adaptation to a changing climate. Recognizing that climate change will make it more difficult to maintain adequate and reliable water supplies for communities, agriculture, and fish, Ecology has identified improved water management as a high-priority overall response strategy, with four specific adaptation strategies and a multi-item list of implementation actions corresponding to each adaptation strategy.

Strategy D-1: Integrated water resources management

The first water resources strategy is to “manage water resources in a changing climate by implementing Integrated Water Resources Management approaches in highly vulnerable basins.” Implementation actions include long-range planning for the Columbia, Yakima, and Walla Walla River basins to account for climate change impacts; documenting “lessons learned” in implementing integrated water resources management plans; expanding integrated management systems to other basins, sub-basins, and aquifers; developing agency guidance for incorporating projected climate information and adaptation actions into decision-making; incorporating “climate change realities” – i.e., the recognition that past hydrologic patterns are not a reliable predictor of future conditions – into agency decision-making on water rights, instream flows, and trust water right transactions; establishing a “well-coordinated water and land use policy” within watersheds; and including climate change adaptation in managing stormwater, wastewater, water quality, water reuse, and potable water demand to ensure that planning and investments will not increase future vulnerability.

Strategy D-2: Improved water supply

The second water resources strategy is to “improve water supply and water quality in basins most likely to be affected by changing climate.” Implementation actions include encouraging local governments to adopt land use policies and practices to direct development away from vulnerable areas, decrease flood risk, and expand restoration of prime agricultural and forest lands, wetlands, and other critical areas; encouraging forest management practices to improve water-holding capacity in watersheds; supporting new surface and aquifer storage by capturing winter and spring runoff “where feasible and environmentally sound” and increasing storage capacity in existing reservoirs; expanding low-impact development

requirements; assisting utilities in implementing adaptation and mitigation strategies; developing early-warning or rapid response systems to protect water systems from extreme climate events; “aggressively” pursuing reallocation and redistribution of water to increase streamflow in critical basins through water transfers and water markets; and improving the performance of existing water infrastructure such as reservoirs.

Strategy D-3: Water conservation and efficiency

The third water resources strategy is to “implement water conservation and efficiency programs to reduce the amount of water needed for irrigation, municipal, and industrial users and to improve basin-wide water supply.” Implementation actions include adopting “the most up-to-date” water conservation technologies, water-efficient practices, alternative water supplies, and new energy-efficient technologies; improving irrigation infrastructure, starting with aging systems in basins most vulnerable to droughts and climate change; implementing water conservation and efficiency standards for industry and business; expanding to other watersheds use of a USGS/National Weather Service “decision analysis tool” developed for the Methow River basin; implementing municipal water efficiency improvements; and seeking “more reliable” funding to help water providers implement climate-ready plans and practices.

Strategy D-4: Risk assessment

The fourth water resources strategy is to “build the capacity of state, tribal, and local governments, watershed and regional groups, water managers, and communities to identify and assess risks and vulnerabilities to climate change impacts on water supplies and water quality.” Implementation actions include providing local communities and watershed groups with water forecast projections to assess watershed vulnerability and examples of management strategies to build resilience; identifying vulnerable areas and developing climate-readiness plans to prepare for and adapt to changes in watersheds; providing tools and incentives for watershed protection and restoration plans focusing on controlling stormwater, reducing flood peaks, reducing sedimentation, increasing aquifer recharge, and restoring instream flows; developing and disseminating best available data and tools on hydrologic changes and hazards and projected impacts on long-term water budgets and ecological resources; expanding a “central clearinghouse of data and case studies” to support adaptation planning and share examples of effective strategies to prepare for climate impacts; helping utilities use tools to evaluate climate change resilience and incorporate information on climate impacts into models used in water, wastewater, and stormwater systems; improving and expanding online data-sharing systems with timely information on weather, soil conditions, crop water requirements, and water efficiency practices; expanding use of meters and other methodologies to gather information on water use; refining regional climate impact assessment tools and models developed by the USGS and other entities to cover climate change impacts on surface waters, groundwater recharge and groundwater availability, and the interaction between climate, hydrology, and vegetation; and working cooperatively with regional climate science centers and scientific agencies to expand existing monitoring networks such as streamflow gages.

Implementation Projects

The *Response Strategy* for water resources is somewhat long on information-gathering and planning, and short on specifics about potential projects that could be characterized as implementation actions. The *Response Strategy* does identify some general categories of actions that might serve as a starting point for watershed planning groups, utilities, local governments, and irrigators attempting to develop projects or regulations to increase resilience and adapt to climate change impacts.

The “irrigation infrastructure improvement” implementation action under Strategy D-3 lists the following examples of projects for improvements to irrigation water delivery and distribution systems:

- Lining ditches
- Piping
- Re-regulating reservoirs
- On-farm conservation
- Pump exchange (replacing water from one source with water from another)
- Water use management projects

The “municipal water efficiency improvements” implementation action under Strategy D-3 lists the following examples of strategies to reduce the amount of water used per person or per household:

- Water rate setting
- Water-smart landscape programs
- Rebates to install or upgrade water-efficient irrigation systems
- Regulations to reduce waste of water used outdoors
- Water-efficient development codes and policies for new development
- Rainwater harvesting from roofs
- Education and public outreach campaigns

Finally, the “central clearinghouse” implementation action under Strategy D-4 lists the following as “effective strategies” to prepare for climate impacts:

- Operational changes
- Engineering and design options
- Green infrastructure approaches
- New infrastructure investment
- Planning
- Land use controls

Legislative Action

In Engrossed Substitute Senate Bill 6091, enacted January 19, 2018, the Legislature took a first step toward watershed protection and restoration planning. The bill creates a new chapter in RCW Title 90 that provides for updating existing watershed plans and developing new watershed restoration and enhancement plans aimed at enhancing streamflows and offsetting impacts of consumptive water use on instream resources. Although the primary driver for this legislation was the Legislature’s desire to adopt explicit requirements for use of permit-exempt wells as adequate water supply for building permits and subdivisions, the establishment and funding of new watershed restoration and enhancement planning efforts will dovetail with one of the implementation actions under Response Strategy D-4.

Compared to the area of water resources, the *Response Strategy* discussion of the area of agriculture encourages potentially more dramatic policy responses involving changes to water resource management. Response Strategy E-2 is to “reduce impacts of severe droughts and extreme weather events on irrigated agriculture.” Two of the items listed as corresponding implementation actions are:

- “Improve water reliability and increase water supplies through continued support for integrated basin water management planning and by fostering voluntary transfer of water. (Changes to current statutes may be needed to provide incentives to increase participation of existing water right holders in water transfer programs.)”
- “Expand and improve the effectiveness of the state’s water right transfer program by seeking statutory changes that provide flexibility and incentives to current water right holders interested in transferring their water to other users.”

The *Response Strategy* does not outline specific legislative changes needed to implement this strategy, and there is no indication that the Legislature intends to consider any new legislation on water resource management during this session.

Conclusion and Implications

Washington state agencies and elected officials are not shying away from discussing climate change and its impacts on water resources. But thus far they have not identified or promoted statutory or regulatory changes to encourage water right transfers or provide more flexibility to water right holders. Time will tell whether the lofty water resources goal of Washington’s *Response Strategy* – to improve water management through “integrated” approaches that address competing water demands for irrigated crops, fish, municipal and domestic water needs, and energy generation – can be met within the constraints of existing laws, regulations, and state funding sources.

Preparing for a Changing Climate: Washington State’s Integrated Climate Change Response Strategy (2012). See <https://fortress.wa.gov/ecy/publications/documents/1201004.pdf>.